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## **Informal Science Learning for Older Adults**

Katherine Brookfield, Sara Tilley, Máire Cox

### **Abstract**

Recent years have seen rapid growth in informal science learning. Evidence suggests that participation in such learning delivers benefits, including improved performance in formal science learning and enhanced interest in science. To date, such learning has typically attended to children and families, with little attention paid to older populations. Older adults are, however, keen knowledge consumers with their participation in learning associated with improved well-being and better health. This commentary presents our experience of developing and delivering an informal science learning event for older adults. Its successes, challenges, and audience reception are considered with a small number of recommendations provided.

### **Keywords**

science festivals, older people, public engagement, knowledge exchange, informal learning

### **Introduction**

Recent years have seen rapid growth in informal science learning, defined as activities outside the formal education system that seek to raise awareness of, interest in, and engagement with, science, technology, engineering, and math (STEM; Lloyd, Neilson, King, & Dyball, 2012). For instance, around the world many towns and cities, plus multiple funding bodies and research institutions now host annual science festivals and/or citizen science events. While more research is needed, evidence suggests that such learning can support improved performance in formal science education, build confidence in undertaking science related tasks, contribute to an individual's understanding of science, and encourage a more positive attitude toward science (Falk et al., 2012).

In compiling this evidence, attention has focused on the experiences of children and families. Older adults' experiences appear, in comparison, critically understudied, yet this population may present distinct learning needs, capacities, interests, and challenges (Bell, Lewenstein, Shouse, & Fede, 2009) that could warrant special accommodations or tailored learning. For example, approximately 40% of those aged 65 years and older are estimated to have a limiting long-standing illness (Age UK, 2016), over a third have never been online (Age UK, 2016), and all will be in a qualitatively different life stage to children and young adults. Aging "Baby Boomers," holding different expectations and seeking different experiences from those of previous generations of older people (Dannefer & Shura, 2009), may bring new and different expectations and experiences to learning, while all older adults will bring "rich histories and knowledge" that could be built on and from which individuals may be able to draw analogies that help open up new concepts (Bell et al., 2009, p. 196).

Informal and formal learning are popular pursuits among older adults. In the United Kingdom, the 2015 Adult Participation in Learning Survey found that some 20% of those aged 65 to 74 years, and 12% of those aged 75 and over, were participating in learning (National Institute of Adult Continuing Education, 2015). Among older adults, such participation has been associated with improved personal well-being (Jenkins & Mostafa, 2012), wider community well-being (Merriam & Kee, 2014), active aging (Boulton-Lewis, 2010), and better health (Narushima, 2008). Older adults themselves report that participation builds confidence and provides opportunities to meet new people and acquire new knowledge (Business, Innovation and Skills, 2012).

The paucity of information on older adults and informal science learning seems at least partly due to a general neglect of this population in the design and provision of such learning—there simply aren't the cases or examples to study (Bell et al., 2009). Out of over 500 public events occurring in British Science Week (2016), a 10-day program of events aimed at celebrating STEM subjects, coordinated by the British Science Association and funded by the Department for Business, Innovation and Skills, just one was created specifically for older adults. Hosted by the University of Portsmouth, this "Study Day" was intended to provide older residents with an opportunity to meet research active scientists and learn more about science (British Science Week, 2016).

Responding to these issues, we sought to develop, deliver, and evaluate a targeted approach for involving older adults in informal science learning, and in doing so, gain insights into older adults' informal science learning needs, interests, and experiences. Working within certain time and cost constraints, we chose to develop and trial a "science festival style event" for older adults. Working on a large, health-related research project, Mobility, Mood and Place (MMP), funded by Research Councils UK, investigating relationships between aging, mobility, health, emotions, and the built environment, we felt strongly positioned to "fill" an event with "content" that would be of interest to older adults. Ward, Howdle, and Hamer (2008) found that a large proportion of the audiences at public engagement events providing health-related information were older adults.

This commentary reports on the processes involved in creating and promoting the event and the overall experience of delivering it in two different settings (a) as a stand-alone event and (b) as a programmed event at Edinburgh International Science Festival. We begin with a brief introduction to science festivals. Importantly, similar to patterns found across informal science learning, we reflect on their apparent proclivity to overlook older adults. We then outline our event. To close, we reflect on where the event succeeded and how it could have been improved and consider its performance as a vehicle for older adults' learning. This evaluation is based on our own reflections and systematically collected audience feedback. To support the development of better programs and experiences, woven into this discussion are a number of recommendations for involving older adults in informal science learning.

## **Science Festivals**

Science festivals are a rapidly growing, international phenomenon (Bultitude, McDonald, & Custead, 2011). Found in many regions, they are particularly common in Europe, especially the United Kingdom (Bultitude et al., 2011; Fogg-Rogers, Bay, Burgess, & Purdy, 2015). Internationally, evidence suggests that some 5.6 million people are reached by science festivals annually (Bultitude et al., 2011), while in the United Kingdom, a 2014 public attitudes to science survey found that almost 3% of those polled had attended a science festival in the previous year (Ipsos MORI, 2014).

For the purposes of our work, we defined science festivals, and consequently, "science festival style events," as time-limited events that seek to (a) celebrate STEM subjects, (b) engage nonspecialist audiences in scientific content (Bultitude et al., 2011, p. 167; Fogg-Rogers et al., 2015; Jensen & Buckley, 2014), and (c) typically facilitate nonformal learning (Fogg-Rogers et al., 2015), where nonformal learning is defined as intentional learning, from the learner's standpoint, that occurs in a nonformal manner without, for instance, accreditation (Fogg-Rogers et al., 2015).

Although the details often differ on matters such as size, composition, funding arrangements, and length (Bultitude et al., 2011; Fogg-Rogers et al., 2015), similarities between science festivals are evident on key points. Of note, they tend to adopt a first-order approach to communicating science (Jensen & Buckley, 2014). Here, knowledgeable scientists seek to inform and educate less

knowledgeable publics (Irwin, 2009). The public is invited to learn more about scientific perspectives, but scientists do not in turn seek to learn more about public perspectives (Irwin, 2009; Jensen & Buckley, 2014). Festivals have sometimes been criticized for promoting this one-way flow of information (Fogg-Rogers et al., 2015); however, research into audience preferences has found that visitors, particularly older visitors (Fogg-Rogers et al., 2015), value and enjoy first-order engagement (Bultitude et al., 2011; Fogg-Rogers et al., 2015; Sardo & Grand, 2016; Ward et al., 2008).

Another noteworthy similarity concerns the audiences that festivals target. An international review found that 95% of festivals targeted families with children and 87% targeted school pupils (Bultitude et al., 2011), while European research found that preschool children and school pupils were the most commonly targeted groups for science communication events (European Science Events Association, 2005). There is no evidence of an equivalent, or indeed any obvious, concern for older audiences. In fact, the physical settings sometimes selected for science festivals indicate that older adults might not even be on the radar when these events are designed and delivered. Posing challenges to some older people, where a festival is laid out across a park, field, or university campus, attendees can, for instance, be required to walk substantial distances between activities and/or traverse uneven ground and steps. Cramped venues with insufficient seating that Sardo and Grand (2016) identified at a large U.K. festival could prove especially troublesome for older adults who, owing to health conditions or physical impairments, might be unable to sit on the floor or to stand. In the absence of relevant research, we can only speculate as to why there seems this apparent blind spot when it comes to older adults. Perhaps festival organizers do not view, or do not wish to view, older adults as a “discrete” target audience. Influencing any such outlook might be concerns about “inclusivity” and/or uncertainty about the validity or appropriateness of treating older adults as a separate group. Conversely, perhaps festival organizers do identify older adults as a discrete group but, possibly because they assume this age-group will be uninterested in science festivals, or their particular life-stage may be thought unsuited to a festival’s core aims, which might be to inspire the next generation of scientists or encourage pupil participation in STEM subjects (see The Big Bang Fair, 2015)[AQ1], they choose to attend to other groups. Of course, with older adults spending an increasing amount of time caring for grandchildren (Geurts, Van Tilburg, Poortman, & Dykstra, 2015), targeting this population might very well be an effective way to connect with “the next generation of scientists.”

### **Creating a Science Festival Event for Older Adults**

We set out to create a free-to-attend science festival style event that presented “content” linked to the aforementioned MMP project and that incorporated several different learning formats and engagement techniques in order to gain insights into what worked. It was felt that a range of activities would ensure a broad appeal and enable visitors to “drop in” in order to sample individual activities of interest. We sought to incorporate traditional first-order engagement techniques that have proved popular with older audiences (Fogg-Rogers et al., 2015), “hands-on” activities that have proved popular with families and younger audiences (Jensen & Buckley, 2014), and, conscious that their use has been encouraged, “second-order” engagement techniques (House of Lords Select Committee on Science and Technology, 2000) that seek “an exchange of perspectives and knowledge” between scientists and publics (Jensen & Buckley, 2014, p. 559). With these concerns in mind, we devised a 1½-hour event featuring expert talks, opportunities for one-to-one conversations with researchers, and hands-on and interactive activities.

Five short (5-10 minute) talks were delivered by researchers on the MMP project. These talks provided bite-sized chunks of information on the project’s interests, methods, and findings and were followed by a short question-answer and discussion session. Before the talks there were

opportunities for audience members to take part in four interactive activities again linked to the MMP project. First, audience members were invited to try on an electroencephalogram headset, used within the project, which measures electrical brain activity. Second, with a researcher on hand to provide explanations, historic City of Edinburgh maps used within the project were displayed. Third, novel suggestions for age-friendly environments, captured in architectural models and drawings and produced for the project, were presented with audience members encouraged to discuss and critique their content. Finally, an exhibition displayed submissions to a photography competition that we operated in the 3-week run-up to the stand-alone event. Members of the public were invited to send in photos, along with an accompanying caption, of places that made them feel happy. To encourage participation, we linked our competition to a photography competition run by the national charity Age Scotland, a partner on the MMP project. There were 27 entries to our competition. A winning photograph (submitted by an 87-year-old) and two runners-up, selected by a panel of judges, each received book tokens.

The stand-alone version of the event ran on March 20, 2015, chosen to coincide with the United Nation's International Day of Happiness. We hoped that by connecting to this relevant, visible event the profile of our event would be raised. Discovering, in the planning stages, that the stand-alone event also sat within Brain Awareness Week, a global campaign to increase public awareness of the progress and benefits of brain research, we sought, given our work with EEG, to link to this initiative hoping again to further raise the profile of our event. Three weeks later, we ran the event as part of Edinburgh International Science Festival (EISF). Founded in 1989, the EISF comprises 2 weeks of free and paid-for activities and events, delivered by multiple institutions and organizations, at traditional and nontraditional science communication venues across Edinburgh (Edinburgh International Science Festival, 2016).

We held the stand-alone event at a large, centrally located, historic concert hall at the University of Edinburgh and the festival event in a large meeting room in a modern, centrally located, University building. We investigated the access arrangements at both venues through in-person visits and discussions with venue staff. As a historic building, we had some reservations about the accessibility of the concert venue, but noting that it was regularly frequented by older audiences attending lunchtime recitals, we assumed it would be suitable for our target audience. This approach provided an opportunity to explore the merits, as settings for informal learning, of different venues.

We wished to target our events at older adults, although not to the exclusion of younger audiences. On engaging with the EISF, however, we learnt that it was not possible to target a particular subset of the adult population. Events could only be framed as being for "adults," defined as visitors aged 14 years plus, or for "families" (Edinburgh International Science Festival, 2015). Consequently, our event was promoted as being for "adults." For the stand-alone version of our event, we promoted it as being "of particular interest to older people" but noted that it was "open to everyone" (OPENspace Research Centre, 2015). In proceeding with both versions of the event there was an opportunity to consider the possible effects of these different approaches.

We promoted the stand-alone version of the event with colorful posters and flyers distributed across Edinburgh and through a number of older people's organizations. Noting that the festival version of the event would benefit from the EISF's huge promotional campaign, we concentrated on promoting the stand-alone event. Social media was used in the promotion of both events. A total of 23 event-related Tweets were posted. These were viewed almost 16,000 times and led to around 250 interactions (favorites, shares, etc.). However, only one audience member reported becoming aware of our events through social media. In our case, social media helped highlight our events and stimulate conversation about them in certain circles, proving particularly effective as a means for

engaging with the media. The Scottish press covered the photo competition with several outlets, including the national broadcaster STV, posting stories. Social media did not, however, appear to encourage audience attendance.

### **Successes, Lessons, and Recommendations**

Almost 50 people registered to attend our stand-alone event, while 40 registered to attend the festival event, which sold out via the EISF website. That a total of 90 people registered to attend the two events suggests, we believe, an appetite for the kind of informal science learning experience we provided. Ultimately, 38 people attended the former and 18 the latter event. Free attendance, which meant there would be no financial penalty for nonattendance, and unusually good weather helped explain the discrepancy between the numbers registering and the numbers attending.

Many of those who attended our events were older adults. Over half of those who completed evaluation forms ( $n = 38$ ) were aged 65 years or over ( $n = 21$ ). These forms, distributed at both versions of the event, explored issues such as the usefulness of the events, whether they were enjoyable, the varied engagement techniques employed, how individuals would use the information presented, whether they would attend similar events in the future, and from where they had travelled.

Those aged 65 years and over, and younger members of the audience, were very positive about the events, with over 90% rating them as very or quite enjoyable and over 80% rating them as very or quite useful. Individuals reported that they would share what they had learnt with others and use what they had learnt to lobby local authorities for local environmental improvements, to impress on elected representatives the importance of good-quality environments, to think about how to help older friends and relatives, and to try to include more health-promoting behaviors in their daily lives. Suggesting an appetite for the kind of event we provided, some 80% of this age-group reported that they would attend a similar event again. Further evidence of this appetite was indicated, we believe, by the distances some older audience members had travelled. While many had journeyed from within Edinburgh, others had travelled from farther afield, including St. Andrews (52 miles from Edinburgh), Glasgow (42 miles from Edinburgh), and Dunfermline (18 miles from Edinburgh).

Older audience members engaged with all aspects of the events, with several commenting positively on the overall mix of activities and talks and how the events differed from the kind of things they had visited before. They engaged in numerous one-to-one conversations with researchers, with the evaluation forms indicating that these discussions were valued. These conversations appeared particularly useful for those who were reluctant to ask questions in public, affording a private space in which their queries could be addressed. There was greater participation in the interactive activities in the stand-alone event. Here, a larger venue provided more space for the activities, offering more opportunities for more people to take part. Overall, the talks appeared to secure the widest participation, with the associated question and answer sessions seeing several older adults ask questions. Indeed, among the audience, older adults appeared to be the most likely to ask questions. The evaluation forms revealed that for some older adults, the talks and associated question and answer sessions were particularly favored. Pertinent here, much of our older audience had previously attended lectures and talks at the university, indicating, perhaps, a predisposition to this kind of engagement while also highlighting that, despite efforts to engage new audiences, our events tended to attract the “familiar faces.” These experiences suggest that traditional first-order engagement has a clear role to play in informal learning for older adults but, and importantly, so do less traditional first-order techniques like interactive activities.

Based on audience member feedback and our own observations, spacious accommodation providing good acoustics; step-free access; conveniently located accessible toilets; supportive, moveable seating with ample leg room, laid out on the flat rather than tiered; plus, depending on the nature of an event, audiovisual equipment matched to the particular dynamics of the space are key to creating a comfortable and conducive setting for informal learning for older adults. Some of these items were absent or not represented as well as they might have been in the concert hall, and this impaired the ability of some older adults to participate fully in our events. Highlighting the all too pervasive problem of disablist spatial organization (Freund, 2001; Kitchin, 1999), finding venues that fully address these criteria can be difficult, especially when the options are limited to older and/or historic buildings. Particularly in these cases, it is essential to critically investigate a venue's accommodation and facilities and, where possible, to do this in person. Last, but importantly, one should never assume that a venue will work for a given event or target audience because it has previously hosted a similar event and/or similar audience. This is a key lesson that we will take away from this experience.

Connecting to EISF delivered labor- and cost savings, reducing the number of tasks we had to undertake to support the festival event, particularly in terms of marketing and ticketing. The event was included in the EISF brochure and website, bringing it to the attention of a large audience, while places were reserved using EISF's online and telephone booking system. Less positively, in connecting to EISF we had to conform to its approach to targeting audiences. Importantly, and as mentioned, we were unable to specifically target older adults. In our stand-alone event where we were able to target this population, the size of the older audience and the distances this audience had travelled were greater. We believe this was at least partly due to the event's direct appeal to older adults. Given this, we question if science festivals should do more to target this demographic.

In conclusion, the number of older adults who booked places at and attended our events, the distances some travelled, and the generally positive feedback we collected indicate that there is an appetite for informal science learning among older audiences and that a science festival style event, of the type we provided, might be an appealing and appropriate vehicle for such learning. We discovered that in delivering learning for this age-group the choice of venue is critical. Furthermore, traditional first-order public engagement has an important role to play but so too might less traditional approaches such as interactive activities. Last, connecting to an established science festival can bring valuable administrative and marketing support, but their frequent focus on particular target audiences might make them less appropriate for engaging with other groups. Overall, we recommend that more informal science learning should be developed with older audiences in mind.

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